

02-24-00

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Michael Krysiak, et al.

For: FORTIFIED MULCH

Assistant Commissioner for Patents  
Washington, D.C. 20231

Sir:

Enclosed is a Patent Application, a Small Entity, Declaration, Assignment postcard, check in the amount of \$345.00 and \$40.00. Please send back postcard and assign Serial Number, filing date and return postcard.

Respectfully Submitted,

*Philip Weiss*

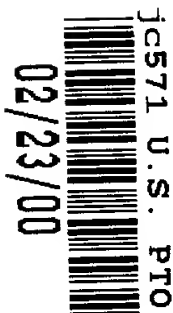
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09510782 02/23/00

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<b>STATEMENT CLAIMING SMALL ENTITY STATUS</b> <b>(37 CFR 1.9(f) &amp; 1.27(c))--SMALL BUSINESS CONCERN</b>		Docket Number (Optional) <b>EEF001</b>
Applicant, Patentee, or Inventor: <u>Michael Krysiak</u>		
Application of: <u>Marking</u>		
Filed or issued: _____		
Title: <u>FORTIFIED MULCH</u>		
I hereby state that I am <input checked="" type="checkbox"/> the owner of the small business concern identified below; <input type="checkbox"/> an official of the small business concern empowered to act on behalf of the concern identified below.		
NAME OF SMALL BUSINESS CONCERN <u>ENCAP, LLC</u>		
ADDRESS OF SMALL BUSINESS CONCERN <u>3921 Algoma Road</u> <u>Green Bay, WI 54311</u>		
I hereby state that the above identified small business concern qualifies as a small business concern as defined in 13 CFR Part 121 for purposes of paying reduced fees to the United States Patent and Trademark Office. Questions related to size standards for a small business concern may be directed to: Small Business Administration, Size Standards Staff, 409 Third Street, SW, Washington, DC 20416.		
I hereby state that rights under contract or law have been conveyed to and remain with the small business concern identified above with regard to the invention described in:		
<input checked="" type="checkbox"/> the specification filed herewith with title as listed above. <input type="checkbox"/> the application identified above. <input type="checkbox"/> the patent identified above.		
If the rights held by the above identified small business concern are not exclusive, each individual, concern, or organization having rights in the invention must file separate statements as to their status as small entities, and no rights to the invention are held by any person, other than the inventor, who would not qualify as an independent inventor under 37 CFR 1.9(e) if that person made the invention, or by any concern which would not qualify as a small business concern under 37 CFR 1.9(d), or a nonprofit organization under 37 CFR 1.9(e).		
Each person, concern, or organization having any rights in the invention is listed below: <input checked="" type="checkbox"/> no such person, concern, or organization exists. <input type="checkbox"/> each such person, concern, or organization is listed below.		
Separate statements are required from each named person, concern or organization having rights to the invention stating their status as small entities. (37 CFR 1.27)		
I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.26(b))		
NAME OF PERSON SIGNING <u>Michael Krysiak</u>		
TITLE OF PERSON IF OTHER THAN OWNER <u>President</u>		
ADDRESS OF PERSON SIGNING <u>3921 Algoma Rd., Green Bay, WI 54311</u>		
SIGNATURE <u>Michael Krysiak</u>		DATE <u>1-10-00</u>

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006220-2840560

## **Fortified Mulch**

### **Field of the Invention**

The invention relates to a composition and method for making mulch fortified with fertilizers via an agglomeration/granulation process.

### **Background of the Invention**

Mulches are commonly applied over grass seed beds. Mulches help to increase seed germination and decrease soil erosion allowing seeds to become firmly established in the seeded area. Mulches typically consist of straw, wood shavings, or paper. In the prior art mulches are mixed with water and agitated in a holding tank, and then sprayed onto a seed bed. Some mulches are woven into blankets that are designed to be laid down over seed beds. Some mulches are chemically bonded natural fiber spray-applied mulches. These mulches use a vegetable gum binder such as guar gum to bind together natural fibers.

Most mulches are loose configurations of unbonded fibers that easily wash away. Paper-based mulches tend to bond into a paper mache-like mat that inhibits oxygen and sunlight transfer, and the ability of seedlings to emerge through the mulch, affecting vegetation establishment. Chemically-bonded mulch forms an almost impenetrable layer over the seed bed that is poor at passing oxygen and water through to the seed bed.

U.S. Patent 5,942,029 discloses a mechanically-bonded, water-absorbent fiber mulch including natural and crimped synthetic fibers that are intimately mixed to form a mechanically-bonded fiber mulch.

U.S. Patent 5,916,027 discloses mulch flakes made from finely divided paper and/or wood, and a surfactant. The flakes contain fertilizer.



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## **Summary of the Invention**

The present invention relates to a process for creating fortified mulch through an agglomeration/granulation process. A moist paper fiber based product is impregnated with NPK (nitrogen, phosphorus, potassium) fortifiers in a mixer. The paper product is combined with the NPK fortifiers either before, or after entry into a mixer. The mixer performs work that results in an agglomerated (or granulated) product that is a homogeneous blend of the paper product and NPK fortifiers. This product is then dried to a desired level of moisture and screened as necessary. A binding agent can be added at the mixer to enhance the agglomeration/granulation process. If a binding agent is added the paper fiber based product need not be moist. To increase the percent of on-sized product, a size reduction operation can be performed on the paper fiber product prior to entry into the mixer.

These and other features and advantages of the preferred embodiment of the present invention will become apparent from the detailed description of the preferred embodiments.

## **Detailed Description of the Invention**

The present invention relates to a process for creating fortified mulch through an agglomeration/granulation process. A paper fiber based product, which can be moist, is impregnated with NPK fortifiers in a mixer. The mixer is preferably a pin mixer but can also be a pan pelletizer, paddle mixer, drum granulator or other type of mixer. The pin mixer is preferably a double helix pin arrangement. The paper fiber based product is preferably comprised of a by product of a paper making process. Sewage sludge can be used to create the fortified mulch rather than paper fibers.

Below is an example of how a fortified mulch product can be made using a pin mixer.

### **Example**

#### **Pin Mixer**

In a pin mixer, agglomeration occurs, when radially extended pins mounted on a high velocity central rotor shaft, in a stationary cylindrical shell impart agitation forces on the material and sprayed liquid binder. This causes a tumbling, turbulent movement resulting in densification.

#### **Pin arrangement**

Several different types of pin mixers were tested to determine the best pin arrangement for creating a fortified mulch. The double helix pin arrangement resulted in a round, more uniform pellet. The internal casing length and diameter were 23 inches and 6 inches, respectively. The dimensions of the shaft and pins included 2-inch diameter shaft and two-inch length pins. The tip speed was not calculated. It was concluded that varying the speed (RPM) effected the pellet size. Increasing the speed caused a decrease in particle size. Also, the higher the speed (RPM) the fewer number of large chunks came through. It is important to note that initial ginding of wet paper sludge drastically reduced chunks discharging the pin mixer. It was found that the pin mixer when set at 650 RPM resulted in a product that consisted largely of end-size (-6, +16) product. Although horsepower draws were not conducted, it was apparent that this material did not require a motor that was larger than FEECO pin mixer specifications. This material created a shell, but its amperage did not increase. Mulch through the pin mixer readily agglomerated and the discharged product was uniform in size and shape.

## **Retention Time**

The FEECO unit was inclined to analyze any improvement of product caused by an increased retention time. No increase in retention time was noticed. A test was conducted to determine the retention time of the. A scoop full of wet paper was spray-painted and fed into the feed hopper. Material began to discharge at 2 seconds and ended at 23 seconds. The majority of the material took 8 seconds. Small particles had short retention time while larger particles took longer.

## **Pin Mixer: Material Feed Rates**

### **Ground wet paper sludge**

Wet paper was added at 33lbs/hr the product was not uniform and round, so the feed was decreased to 200lbs/hr. A uniform product was achieved at this rate. It was preferable to use a rate of 200lbs/hr, however, a rate between 200 and 300lbs./hr is also acceptable. The wet paper sludge bridged in the screw feeder. The 3" feeder was the most consistent.

### **Water**

An added 36-lbs./hr water was metered into the pin mixer. The percent moisture in the paper was 52.3% water. A total of 140.6 lbs./hr of moisture is introduced when 200lbs./hr of wet sludge is metered into the pin mixer.

### **NPK**

The NPK fortifiers were added to the pin at a rate of 28 lbs./hr. A vibratory feeder was required to feed such a low rate. The fertilizer had to be screened prior to addition into the feed hopper.

## **Coating Drum**

### **Wet Mulch Pellets**

The wet mulch pellets were hand fed into a rotary drum. The drum had no apparent problem with varied low or high feed rates. The rotary dryer placed limitations onto the coating drum feed rate. The majority (>90%) of agglomeration is done in the pin mixer. Since the material sent into the coating drum was in the form of a pellet, the material readily rolled. The retention time of the mulch was approximately 1-2 minutes shorter than for an encapsulated seed (4-5 minutes).

### **Dryer**

The pin mixer was not the only component limiting the feed rate, for the rotary dryer was not able to sufficiently dry the NPK fortified paper pellets. The increase in moisture also forced the reduction in the feed rates.

The inlet and outlet air temperatures were 1100 degrees Fahrenheit and 180F, respectively. The sample at these settings had a material outlet temperature ranging from 150 to 175 degrees Fahrenheit and moisture content of 2.5%.

### **Sieve analysis**

A sieve analysis was conducted with the use of a screen. The end-size portion was between 6 and 16 mesh. A three-hour continuous run was produced, dried, and screened. The results concluded a total of 300 lbs. of material; 206 lbs. on-size (68.7%), 53 lbs. under-size (17.7%), and 41 lbs. over-size (13.7%).

While the invention has been particularly shown and described with reference to the preferred embodiment of the present invention, it will be understood by those skilled

in the art that the foregoing and other changes in form may be made therein without departing from the spirit and scope of the invention.

1. An agglomeration/granulation method for creating a fortified mulch comprising:  
adding paper fibers to a pin mixer;  
adding NPK fortifiers and a binding agent before or at said mixer;  
drying contents of said mixer.
2. The method of claim 1 wherein the pin mixer is replaced with a pan pelletizer.
3. The method of claim 1 wherein the pin mixer is replaced with a paddle mixer.
4. The method of claim 1 wherein the pin mixer is replaced with a drum granulator.
5. The method of claim 1 wherein said pin mixer has a double helix pin arrangement.
6. The method of claim 1 wherein said paper fibers are comprised of a by-product of a paper making process.
7. The method of claim 1 wherein said paper fibers are replaced with sewage sludge.
8. An agglomerated/granulated mulch product that is comprised of NPK fortifiers and paper fibers.

## **Abstract**

The invention relates to a composition and method for making mulch fortified with fertilizers via an agglomeration/granulation process.

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PTO/59/01 (11-87)

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# DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION (37 CFR 1.63)

☒ Declaration  
Submitted  
with Initial  
Filing

OR

☐ Declaration  
Submitted after Initial  
Filing (surcharge  
(37 CFR 1.16 (e))  
required)

Attorney Docket Number	FEE001
First Named Inventor	Michael Krysiak
<b>COMPLETE IF KNOWN</b>	
Application Number	/
Filing Date	
Group Art Unit	
Examiner Name	

As a below named inventor, I hereby declare that:

My residence, post office address, and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

FORTIFIED MULCH

the specification of which

(Title of the invention)

☒ is attached hereto

OR

☐ was filed on (MM/DD/YYYY)

as United States Application Number or PCT International

Application Number

and was amended on (MM/DD/YYYY)

(if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment specifically referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56.

I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or 365(b) of any foreign application(s) for patent or inventor's certificate, or 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or of any PCT international application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application Number(s)	Country	Foreign Filing Date (MM/DD/YYYY)	Priority Not Claimed	Certified Copy Attached?	
				YES	NO
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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☐ Additional foreign application numbers are listed on a supplemental priority data sheet PTO/59/025 attached hereto.

I hereby claim the benefit under 35 U.S.C. 115(a) of any United States provisional application(s) listed below.

Application Number(s)	Filing Date (MM/DD/YYYY)	<input type="checkbox"/> Additional provisional application numbers are listed on a supplemental priority data sheet PTO/59/025 attached hereto.

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## DECLARATION — Utility or Design Patent Application

I hereby claim the benefit under 35 U.S.C. 120 of any United States application(s), or 365(c) of any PCT international application designating the United States of America, filed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT international application in the manner provided by the first paragraph of 35 U.S.C. 112, I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.55 which became available between the filing date of the prior application and the national or PCT international filing date of this application.

U.S. Parent Application or PCT Parent Number	Parent Filing Date (MM/DD/YYYY)	Parent Patent Number (if applicable)

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As a named inventor, I hereby appoint the following registered practitioner(s) to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith:

<input type="checkbox"/> Customer Number <input type="text"/> OR <input checked="" type="checkbox"/> Registered practitioner(s) name/registration number listed below		Place Customer Number Bar Code Label here
Name	Registration Number	
Philip M. Weiss	34,751	

☐ Additional registered practitioner(s) named on supplemental Registered Practitioner Information sheet PTO/SB/020 attached hereto.

Direct all correspondence to: ☐ Customer Number or Bar Code Label  OR ☒ Correspondence address below

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Name of Sole or First Inventor:		<input type="checkbox"/> A petition has been filed for this unsigned inventor	
Given Name (first and middle BLANK)		Family Name or Surname	
Michael		Krysiak	
Inventor's Signature	Michael Krysiak		Date
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Post Office Address	3554 Highland Center Drive		
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City	State	Zip	Country

☒ Additional inventors are being named on the supplemental Additional Inventor(s) sheet(s) PTO/SB/02A attached hereto.

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## DECLARATION

ADDITIONAL INVENTOR(S)  
Supplemental Sheet  
Page 3 of 3

Name of Additional Joint Inventor, if any:		<input type="checkbox"/> A petition has been filed for this unsigned inventor					
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Residence: City	Green Bay	State	WI	Country	USA	Citizenship	US
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Post Office Address							
City		State		ZIP		Country	
Name of Additional Joint Inventor, if any:		<input type="checkbox"/> A petition has been filed for this unsigned inventor					
Given Name (first and middle (if any))		Family Name or Surname					
Bryan A.		Fish					
Inventor's Signature	<i>Bryan Fish</i>					Date	2/14/00
Residence: City	Green Bay	State	WI	Country	USA	Citizenship	US
Post Office Address	1565 Elm Street						
Post Office Address							
City		State		ZIP		Country	
Name of Additional Joint Inventor, if any:		<input type="checkbox"/> A petition has been filed for this unsigned inventor					
Given Name (first and middle (if any))		Family Name or Surname					
Ronald D.		Richhorn					
Inventor's Signature	<i>Ronald D. Richhorn</i>					Date	2-14-00
Residence: City	Green Bay	State	WI	Country	USA	Citizenship	US
Post Office Address	1524 1/2 Cedar Street						
Post Office Address							
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